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Prevalence and Associated Factors of Intestinal Parasitic Infections in Selected Areas of Mugum Karmarong Rural Municipality

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ABSTRACT

Background: Parasitic infection is still a serious public health problem in the world. Intestinal parasites infect about 3.5 billion people, and these infections cause illness in 450 million children. In Nepal, intestinal parasitic infections which are most prevalent in children and are the major public health problem. The objective was to study the prevalence and associated factors of intestinal parasitic infection among the people living in the selected area of Mugum Karmarong Rural Municipality.

Methodology: A community-based quantitative cross-sectional study was carried out in selected area of Mugum Karmarong Rural municipality, Mugu district. Total 250 stool samples were collected randomly and the stool samples were examined by direct smear method. Systematic Random Sampling was used and sampling unit was the individual who provided the stool sample.

Results: The prevalence rate of intestinal parasitic infection among the people living in selected area of Mugum Karmarong Rural Municipality was 8.4% (21/250). Parasites detected were Taenia Saginata, Ascaris lumbricoides ,Trichuris trichuira, Anchylostoma duodenale, E. Histolytica and H. nana. Prevalence of intestinal parasitic infection who had the habit of consuming raw meat was slightly high (9.09%) than who doesn't had the habit of consuming raw meat (8.36%). Statistically there was significant difference (P <0.05). Overall prevalence of intestinal parasitic infection on those who had the habit of consuming Non-vegetarian was high (8.4%) whereas the respondent who had the habit of consuming vegetarian had no cases of parasitic infection. Statistically there was significant difference (P <0.05). Prevalence of intestinal parasitic infection who had the habit of consuming raw meat was slightly high 9.09% (1/11) than who doesn't had the habit of consuming raw meat 8.36% (20/239). Statistically there was significant difference (P <0.05).

Conclusions: Proper distribution of anti-helminths drugs, good personal hygiene, good sanitation and basic knowledge regarding intestinal parasitic infection showed protective effect whereas, consumption of raw meat causes parasitic infection. Awareness program about the parasitic infections or mode of transmissions should be run. Consumption of raw meat should be strictly discouraged and properly cooked meat should be consumed.

Key words: Helminths, protozoans, Tania saginata, Mugum

BACKGROUND

Parasites are organisms that live off other organisms, or hosts, to survive. Some parasites don't noticeably affect their hosts. Others grow, reproduce, or invade organ systems that make their hosts sick, resulting in a parasitic infection (1). Intestinal parasites infect about 3.5 billion people, and these

infections cause illness in 450 million children (2). One of the major causes of intestinal parasitic disease in developing nations is fecal pollution of water, a lack of basic sanitation, as well as environmental and sociocultural variables that facilitate parasite transmission (3). Ascariasis, Hookworm infection, and Trichuriasis are considered the most prevalent intestinal parasitic infections worldwide and are associated with high rates of morbidity and mortality. In addition intestinal parasite infections have also been connected to physical weakness, poor educational achievement, low socioeconomic level, unfavorable personal and environmental tropical climate, and low altitude in the poorer parts of the population (4). Several nations in the Association of Southeast Asian Nations (ASEAN) continue to have high rates of soil-transmitted helminthic infections (5). It is reported that the prevalence of intestinal parasites in Nepal varies considerably from one study to another study and reaches nearly 100% in some tropical areas (6,7). Nepal is a small, impoverished nation in South Asia that has a high frequency of infectious diseases such intestinal parasitosis (8). In this context, determining factor might be low socio-economic status of the people. Also, knowledge of intestinal parasites, illiteracy and occupations have been reported to increase the risk of STH infection in many indigenous populations in Nepal (9). The majority of the morbidity and mortality caused by parasite diseases are found in tropical and subtropical areas, where they are responsible for a large amount of morbidity and mortality (10). The routes of exposure and infection which include fecal-oral transmission, contaminated drinking water, undercooked meat and transmission through the soil Gastrointestinal parasites are common among them due to the consumption of poor quality drinking water (11).

Despite socioeconomic development and demographic changes in Nepal over decades, IPIs are still highly endemic, especially among the indigenous communities (11–13) where the most common intestinal parasites infecting various indigenous communities in Nepal reported are Ascaris lumbricoides, Trichiuris trichura, Ancylostoma duodenale, Strongyloides stercoralis, Taenia sp., Cyclosporacayetanensis, Hymenolepis nana, Entamoeba histolytica, Giardia lambia (14). Under the deworming program, Family Welfare Division (FWD), Department of Health Services (DoHS), Government of Nepal (GoN) has been distributing anti-helminthic drugs along with Vitamin A supplementation biannually (April and October each year) free of cost (15). One of the major causes of intestinal parasitic disease in developing nations is fecal pollution of water, a lack of basic sanitation, as well as environmental and socio-cultural variables that facilitate parasite transmission (3,16).

As being the part of the same globe, Nepal—a small underdeveloped country of south Asia has also been affected by the intestinal parasitic infections which are most prevalent in children and are the major public health problem across the country (17). In Nepal, children are more commonly infected than adults. Intestinal helminthes commonly reported from Nepalese children are Ascaris lumbricoides, hookworm and Trichuris trichiura (7,18).

Nepal has some of the poor indicators in south Asian region, with high rate of malnutrition (19,20). Slightly more than half of the given population have access to basic sanitation facilities whereas river water is the main source of water for drinking (21,22). Limited number of studies have described that there is more general burden of gastrointestinal parasites in Nepal.

METHODS

A cross-sectional study was conducted at a single point in time to characterize the distribution of intestinal parasites in terms of time, location, and demographic factors. A quantitative approach was employed to analyze the data in numerical format. Study population were ≥20 years from ward no 8, Mugum Karmarong Rural municipality in Mugu district of Nepal. With reference to a previous study p value: 18% (23). Sample size was calculated by the following formula: Sample size (n)=z2pq/d2 . Total sample size of this study was 250 from different age and sex of Lama Peoples. The study population was divided into 3 age groups i.e. 20-39 years, 40-59 years and 60 years or above and stool samples were collected. Sampling frame was constructed by taking the voter list of the people with the help of ward office. The name was listed according to the age from the 20 years and above. After that code number was given to the entire name list then the total interval value k was detected. From the selected sampling code no. sample was taken for the study research.

Sampling unit was the individual person who provide stool sample. Two hundred fifty peoples were randomly selected for the study purpose. After proper instructions, vials were given to the people regarding collection of the stool sample, they were given sterile labeled vials and application sticks. Each of the specimens was checked for its labeling. The collected stool samples were tested in the health post by hiring a lab assistant form Laboratory of Riusa community hospital in Mugum Karmarong Ward No. 6.

Inclusion criteria

People who were given consent for the study and aged ≥20 years old were taken. Only the permanent residents of ward no. 8 were included for the data collection.

Exclusion criteria

People who don't give consent for the study and aged ≤19 years old were not taken. Differently able people who can't respond and people with anti-parasitic drug within the last three months were excluded from the study.

Stool collection technique

Stool sample 5-10 gm (solid), 5 ml (liquid) was collected in clean, wide mouth, plastic container with the spatula connected with lid. After the collection of sample, it should be processed as soon as possible preferably within two hours.

Methods of stool examination

Microscopic examination was carried out for the detection and identification of protozoal cysts, oocysts, trophozoites, and helminthic eggs or larva. Macroscopically examination was done by saline and iodine wet mount. The slides were observed under low power(10x) followed by high power (40x) of microscope. The direct visualization of each sample was done for color, consistency, presence of mucus, blood, and adult worm or worm segment.

Saline mount of stool preparation method

Clean and grease-free slide were taken. One drop of physiological saline was added and then a stool equivalent to a match stick head (2 mg) with the help of a stick was added. If the stool specimen is still somewhat solid, a drop or two drop of saline to the specimen will be added and mix. The resultant mixture should not be opaque (place the slide in the top of this page under the mixture, if the mixture is too thick then add more water or use less feces. Coverslip was added and observed under low power(10x) followed by high power (40x) of microscope. Be sure that to reduce brightness (adjust light intensity) and increase contrast (adjust consider to down position) so that eggs or trophozoites and their internal structure are easily seen. Entire smear was examined systematically for parasite ova, worm larvae, or protozoan structure. Saline wet mount was used to detect helminth eggs, larvae and the protozoan trophozoites and Iodine wet Mount was mainly used for detecting protozoa cysts.

Data collection technique

The primary data were collected by questionnaires method and stool samples were collected from the interviewed individuals for examining. Semi-structured questionnaire and face to face interview were undertaken.

Validity and reliability

Microscopic examination was done for the detection of the intestinal parasitic infection. Crosschecking of data was donethrough every day data entry and analysis of collected data. Guidance was done by the guide.The researcher himself administered the questionnaire to the respondents in order to minimize error and ensure validity and reliability.

Data management and analysis

The data were entered in Epi-Data and analyzed in SPSS version 20. Descriptive and/ or inferential statistics were done. In descriptive analysis, Univariate analysis (mean, median and S.D.) were done. In inferential statistics analysis, Chi square test was used to measure the association between two variable i.e. independent and dependent variable. The p-value of less than 0.05 was considered as statistically significant.

Ethical consideration

Ethical consideration was taken from Institutional Review Committee (IRC KAHS), Ref. No. 079/080/14 on 21st August 2022.

RESULT

A total of 250 stool sample were collected and examined to assess the prevalence of intestinal parasites. Out of 250 adult people, 99 (39.6%) adult male people and remaining 151 (60.4%) were adult female people. In age group (20-39) number of female respondent (96) is higher than that of male whereas the lowest respondent is 17 which is included in the age group over 60 years (Table 1).

Prevalence of Intestinal Parasitic infections:

Total of 250 adult people 21 were found to be positive. Hence, the prevalence rate of intestinal parasitic infection among the people living in selected area of Mugum Karmarong Rural Municipality was near about nine percentages (8.4%). The result indicated that parasitic infection in male (9.09%) which is slightly higher than female (7.93%). However, in both of these groups the prevalence of Helminth (9.09%) is higher in male than female but in Female (2.64%) protozoa with no case in male. (Table 2)

Table 1. Age and sex wise respondent

Age group	Male		Female		Total	
	Number (n)	Percentage (%)	Number (n)	Percentage (%)	Number (n)	Percentage (%)
20-39	60	60.60	96	63.57	156	62.4
40-59	22	22.22	35	23.17	57	22.8
	17	17.17	20	13.24	37	14.8
Total	**99**		**151**		**250**	

Table 2. Sex wise prevalence of parasitic infection

Parasitic infection E. Histolytica		Protozoa		Helminth					
		Total n (%)	Taenia saginata	Ascaris luumbricoides	Ancylostoma duodenale	Trichuris trichiura	H. nana	Total n (%)	
Male	99	0	0%	6	1	1	0	1	9(9.09%)
Female	151	4	(2.64%)	3	0	3	1	1	8(7.93%)

Table 3. Intestinal parasitic infection in relation to associated factors

Associated factors	Number	Protozoa	Helminth	Chi-square	p-Value
Hand washing after toilet					
Yes	221	3(1.35%)	15(6.78%)	0.463	0.496
No	29	2 (6.89%)	1(3.44%)		
Total	**250**	**5(8.24%)**	**16(10.22%)**		
Hand washing before meal					
Yes	242	3(1.23%)	15(6.19%)	0.463	0.496
No	8	1 (12.5%)	2(25%)		
Total	250	4(13.73%)	17(31.19%)		
Habits of cutting nails					
Yes	123	1(12.5%)	4(3.25%)	0.004	0.950
No	127	3 (1.23%)	13(10.23%)		
Total	**250**	**4(13.73%)**	**17(13.48%)**		
Types of drinking water					
Boiled	5	0	1(20%)	0.247	0.619
Without purification	245	4(1.63%)	16(6.53%)		
Total	**250**	**4(1.6%)**	**17(6.8%)**		
Literacy					
Literate	125	2 (1.6%)	12(9.6%)	0.618	0.432
Illiterate	125	2 (1.6%)	5(4%)		
Total	**250**	**4(3.2%)**	**17(13.6%)**		
Habit of consuming raw meat					
Yes	11	1(9.09%)	0	4.463	0.035
No	239	3 (1.25%)	17(7.11%)		
Total	**250**	**4(10.34%)**	**17(7.11%)**		
Habit of walking bare foot					
Never	122	1(0.81%)	2(1.64%)	0.869	0.648
Sometimes	121	3(2.48%)	13(10.75%)		
Frequently	7	0	2(28.57%)		
Total	**250**	**4(1.6%)**	**17(6.8%)**		

The result of stool examination shown overall presence of intestinal parasitic infection of those who doesn't washed hand after toilet was high (10.33%) than who washed hand after toilet (8.13%). Intestinal parasitic infection of those who doesn't washed hand before meal was high (37.5%) than who wash hand before meal (7.42%). Prevalence of intestinal parasitic infection of those who have the habit of cutting nail was high (15.75%) than who doesn't have habit of cutting nail (11.46%). Incidence ofIntestinal parasitic infection who had the habit of drinking water with boiling was high(20%) whereas the respondents who had the habit of drinking water without purification were (8.16%). Statistically there was no significant difference ($p < 0.05$). Prevalence of intestinal parasitic infection who had the habit of consuming raw meat was slightly high (9.09%) than who doesn't had the habit of consuming raw meat (8.36%). Statistically there was significant difference ($p<0.05$) (Table 3).

DISCUSSION

This is the first community-based study to find out the intestinal parasitic infection among the people living in the selected area of Mugum Karmarong Rural Municipality. Prevalence of intestinal parasitic infection in male was 3.6% and 4.8% in female. Hence, the prevalence rate of intestinal parasitic infection among the people living in selected area of Mugum Karmarong Rural Municipality was 8.4%. In this study, from the total 250 respondents more than one third were male and near about two third were female, among them out of total 21 positive near about half 9(42.85%) were from the male respondent and more than half 12 (57.14%) were from the female respondent had intestinal parasitic infection whereas a study conducted by Chaudhary et al, The overall prevalence of infection was found 28.63% the parasitic infection was marginally higher in males (29.73%) compared to females (27.52%) (14).

Here, in our study out of 21 positive cases more than one fourth (4, 19.04%) were protozoa and more than two third (17, 80.95%) were helminths likewise Taenia Saginata were 9 respondents (3.6%) E. Histolytica, 4 respondents (1.6%), AscarisLumbricoides 1 respondent (0.4%), Anclyostomaduodenale4 respondents (1.6%), Trichuristrichiura1 (0.4%)respondent and H. nana 2 respondents (0.8%) whereas a study conducted by the Dhakal et al, Specific gastro intestinal parasites identified in the study were namely Ascaris lumbricoides (19.33%), Entamoeba coli (2.67%), Taenia solium (2.67%), Hookworm (2.67%) and Trichuris trichiura (2%) (13). In our study, prevalence of intestinal parasitic infection among people recently suffering from diarrhea and habit of consumption raw vegetables were significantly difference.

The result of stool examination shown overall presence of intestinal parasitic infection of those who doesn't washed hand after toilet was high (10.33%) than who

washed hand after toilet (8.13%). Intestinal parasitic infection of those who doesn't washed hand before meal was high (37.5%) than who wash hand before meal (7.42%). Prevalence of intestinal parasitic infection of those who have the habit of cutting nail was high (15.75%) than who doesn't have habit of cutting nail (11.46%). Incidence of Intestinal parasitic infection who had the habit of drinking water with boiling was high (20%) whereas the respondents who had the habit of drinking water without purification were (8.16%). Statistically there was no significant difference ($p<0.05$). Prevalence of intestinal parasitic infection who had the habit of consuming raw meat was slightly high (9.09%) than who doesn't had the habit of consuming raw meat (8.36%). Statistically there was significant difference ($p <0.05$).

CONCLUSIONS

Proper distributions of anti-helminthic drugs, good personal hygiene, good sanitation, basic knowledge regarding intestinal parasitic infection are the reason behind the low percentage of parasitic infection in Mugum Karmarong Municipality. The condition of toilet, habits of eating raw and unwashed vegetables, consumption of raw meat, contamination of their hands and nails while consumption of food are the main causes of parasitic infection. Public health intervention is necessary for the proper minimization of the intestinal parasitic infection rate.

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Conflict of Interest

The authors declare no conflict of interest.

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